Infrared Canopy Temperatures of Early Maturing Peach Trees under Deficit Irrigation

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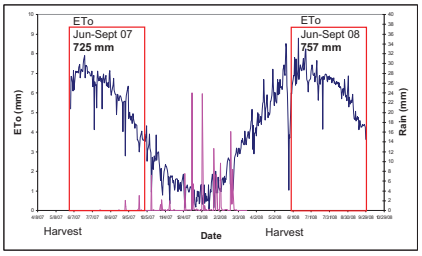
Introduction

An early-season peach, "Crimson Lady" (*Prunus persica (L.)* Batsch), is generally harvested in late May to early June in central California. To reduce water use, regulated deficit irrigation may be applied to these trees for the remaining and also the most water demanding season (mid June to November).

As shown in the following figure, reference ET (ETo) was 725 mm for June –Sept 2007 and 757 mm June – Sept 2008. These post harvest water demands may not need full replacement from irrigation because peaches not on the tree during these periods.

2007-2008 CIMIS ETo, Parlier, CA



Objective and Project Goal

The objective of this research was to evaluate canopy temperature and yield responses to postharvest deficit irrigation in peach trees.

The goal of the project was to develop a remotely-sensed canopy temperature approach for managing deficit irrigation of this type of crop.

Field Description

A field study was initiated to evaluate an infrared thermometer (IRT) system for evaluating water stress in peach trees and potential application for irrigation management. The field site was located at the USDA-ARS San Joaquin Valley Agricultural Sciences Center near Fresno, CA. The trees were planted in April 1999, but the deficit irrigation treatment has been imposed since 2007. Soil at the site is a Hanford sandy loam overlying a hardpan located at about 1.5 m from the soil surface. Based on a underground weighing lysimeter measurement, average annual crop ETc from 2002 to 2004 was 1126 mm. Average annual total precipitation was 210 mm for the same period.

Methods and Procedures

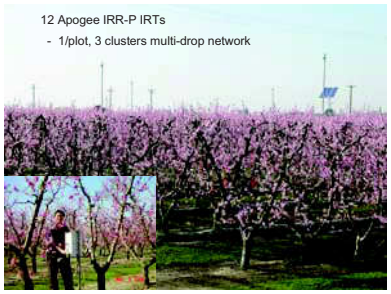
Deficit Irrigation Treatment - Post Harvest

Experimental Design: Randomized-block

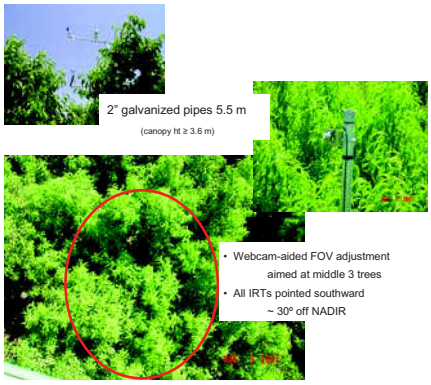
Treatment 1 = F1, Furrow 100% ET
Treatment 2 = F2, Furrow SWP > 20 bar or 2 MPa
Treatment 3 = S1, Subsurface drip 100% ET
Treatment 4 = S2, Subsurface drip 25% ET

Each treatment replicated 3 times
Each treatment plot: 3 rows, 8 trees/row
(6' tree spacing, 16' row spacing)

IRT Placement in Orchard

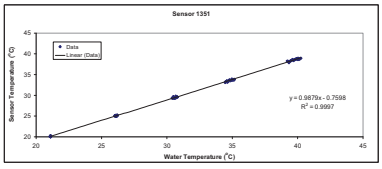


Weather Station and IRT FOV Adjustment



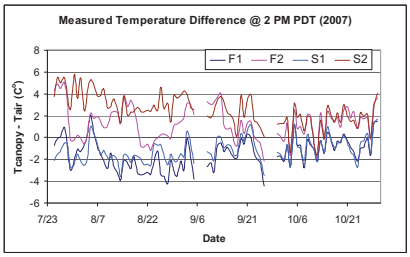
IRT Lab Calibrations

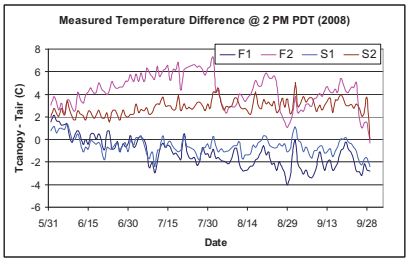
- All IRT sensors lab tested w/ water bath @ 5 temperature settings
- New calibrations for each sensor to account for extension wires (25 to 50 m)
- Variations in sensor readings were ≤ 0.1 °C



Preliminary Results

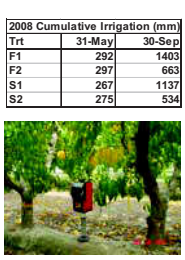
IRT Temperatures

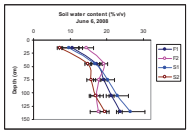


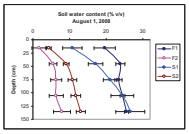


Soil Water Content

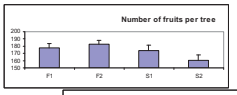
2008 Cumulative Irrigation (mm)		
Trt	31-May	30-Sep
F1	292	1403
F2	297	663
S1	267	1137
S2	275	534





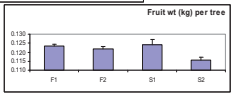


Yield and Quality



2008 Harvest

2007 Cumulative Irrigation (mm)			
Trt	Mar-May	Jun-Nov	Total
F1	213	1030	1243
F2	268	405	673
S1	194	977	1171
S2	243	241	484



Summary

- Tcanopy > Tair under deficit irrigation (both furrow and drip)
- d(Tcanopy-Ta) correlated with soil water
- Potential impact on yield and fruit quality in S2 (drip + deficit ET replacement)
- Next step: d(Tcanopy-Ta) → Irrigation Scheduling

POSTER NUMBER 6